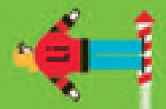


For Finn and Zac – C.S.
For Maia and Nora – X.A.

BIG PICTURE PRESS

First published in the UK in 2020 by Big Picture Press,
an imprint of Bonnier Books UK,
The Plaza, 535 King's Road, London, SW10 0SZ
www.templarco.co.uk/big-picture-press
www.bonnierbooks.co.uk

1 3 5 7 9 10 8 6 4 2

ISBN 978-1-78741-734-2

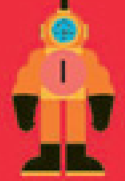
This book was typeset in Ulissa and BSKombat.
The illustrations were created with graphite, wax and ink,
and coloured digitally.

Edited by Sophie Hallam and Joanna McInerney
Designed by Lee-May Lim, Edward Jennings and Adam Allori
Production Controller: Emma Kidd

Consultant: Nathan Adams

Printed in China

FSC DUMMY



The EXTRAORDINARY ELEMENTS

Written by COLIN STUART
Illustrated by XIMO ABADÍA

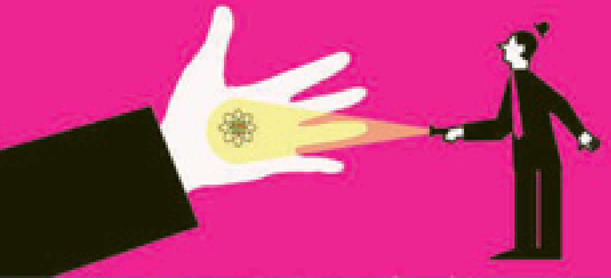
B P P

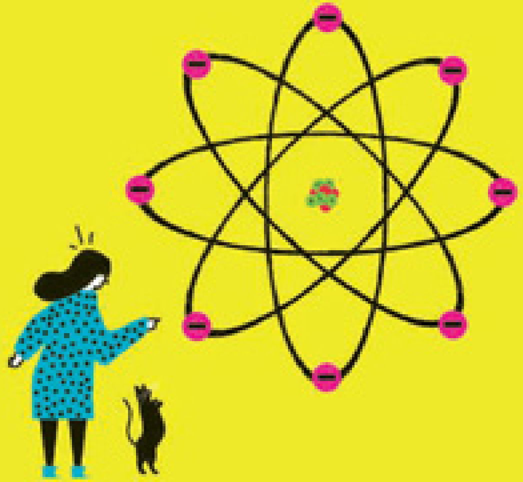
CONTENTS

The Extraordinary Elements

Hold up your hand. What is it made of? Skin? Bone? But what are they made of?

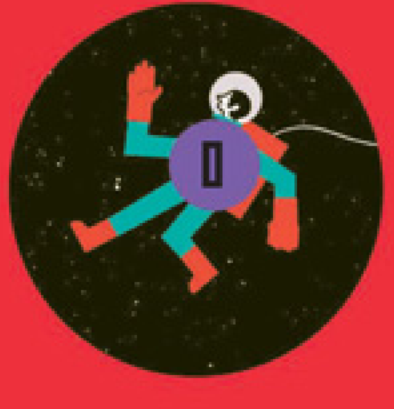
Imagine using a microscope to zoom right down to scale ten million times smaller than a millimetre. If you could, you'd see that your hand – along with everything else in the Universe around us – is made of tiny building blocks called atoms. This book is your guide to this amazing atomic world.

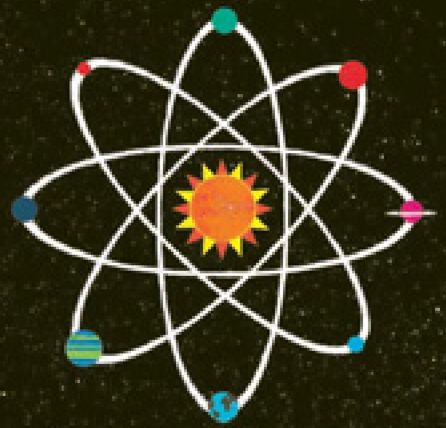




In the middle of an **atom** you will find the **nucleus**. It is made of particles called **protons** and **neutrons**. Whizzing around this nucleus are **electrons**. Most of an atom is empty space – there's a large gap between the nucleus and the electrons. If you blew up an atom to the size of a city like London, UK then the nucleus would be about the size of a single person standing in the middle.

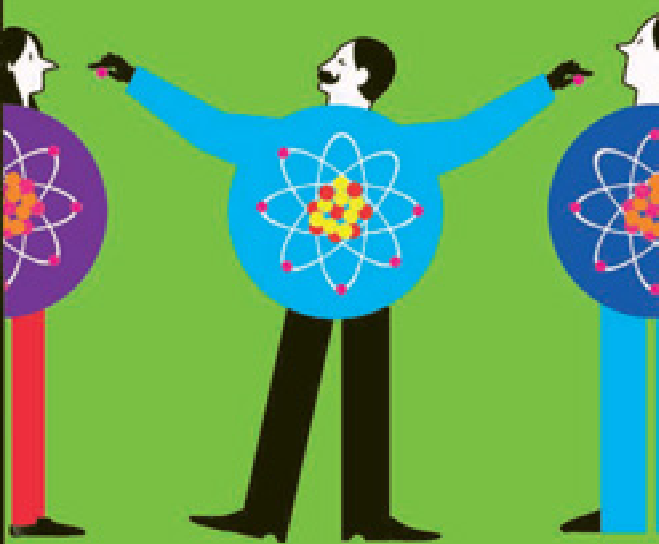
All atoms with an identical number of protons are given the same name. Gold, for example, has 79 protons. The oxygen you're breathing in right now has eight. These different materials are known as the **elements** and there are over one hundred of them. In the pages that follow you'll discover just how extraordinary these elements can be.





Chemistry is the study of the elements and the way they behave and interact with each other. A lot of chemistry boils down to the exact way electrons orbit the nucleus. They do this in layers called **shells**, which are bit like the orbits of planets around the Sun.

An element prefers to have full shells of electrons because it makes it more stable. So often it will try to borrow electrons if it needs more, or get rid of some if it has too many.



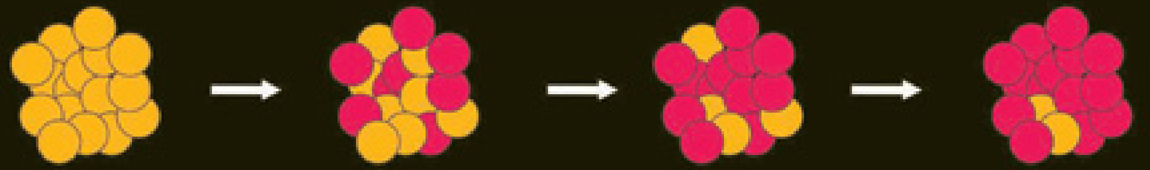
Elemental Basics

Elements are a bit like spies – each one has a secret code name. James Bond is famously 007. Similarly, chemists give special numbers to each element. The first is called the **atomic number** and is given the symbol Z. It counts the number of protons in the nucleus of that element. No two elements share the same atomic number – it's their unique signature. Chemists also talk about the **mass number** (given the symbol A). This is the total number of protons and neutrons added together.

Element	Symbol	Z	A
Nitrogen	N	7	14.007

Just like you can get different breeds of dogs or cats, it is possible to get different versions of the same element by adding extra neutrons. Take helium for example. Its atomic number is two because it always has two protons. But it can have anywhere between zero neutrons (helium-2) and eight neutrons (helium-10). The number after the element is the mass number.

Each element may be unique, but there are things that groups of elements have in common. Most are **solid** at normal room temperature (20°C). There are only twelve that are **gases** (hydrogen, helium, nitrogen, oxygen, fluorine, chlorine and the six noble gases). Just two elements – bromine and mercury – are **liquids**. Francium, caesium, gallium and rubidium will melt from solid to liquid if the temperature rises to 40°C.



The bigger an atom gets (the higher its mass number) the more unstable it becomes. Unstable atoms often break apart into smaller ones. This process is a called **radioactive decay** and all elements heavier than bismuth are radioactive. Imagine you had one hundred atoms of a radioactive element. The time it takes for half of them to decay is called the **half-life**. This can be incredibly quick – just a tiny fraction of a second – or many billions of years.

Chemistry 101

Elements crave stability. They can achieve this by acquiring a full outer shell of electrons. This can be done by filling up the outer shell with missing extra electrons or losing stray electrons so that the full shell beneath becomes the outermost. Atoms do this through a process called **bonding**. An **ionic bond** sees one atom donate electron(s) to another. **Covalent bonding** occurs when two or more atoms share electrons between them.

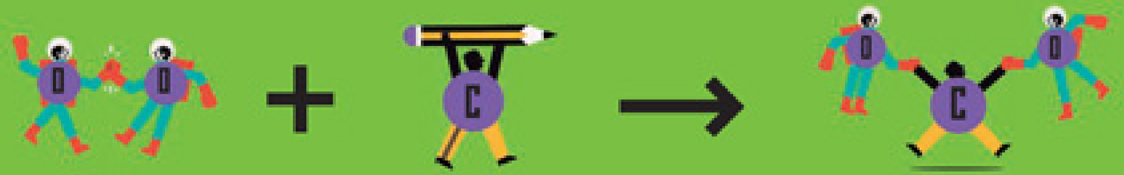
IONIC BONDING

COVALENT BONDING

Chemists write down a chemical reaction in the form of a **chemical equation**. An arrow separates the ingredients and the products and each chemical is separated with a plus sign. Chemicals that exist as molecules (two or more atoms joined together) have little numbers to tell you how many atoms they contain. H_2O for water is perhaps the most famous example – a water molecule has two atoms of hydrogen and one of oxygen.

N_2 Na H_2O

Other symbols can help make it clear what is happening during a chemical reaction. Sometimes a reaction is reversible, meaning the products can turn back into the ingredients. This has a special double arrow symbol. Letters also symbolise the state a substance is in: (g) for gaseous, (s) for solid, (l) for liquid and (aq) for aqueous (meaning dissolved in water).



O_2 (g) C (s) CO_2 (g)

Mass is always conserved during a chemical reaction. That means the total number of atoms that go into a reaction must equal the total number of atoms produced. So it is important to make sure the reaction you write down is balanced. This is done by adding numbers in front of each **chemical symbol** so that each side adds up to the same total.

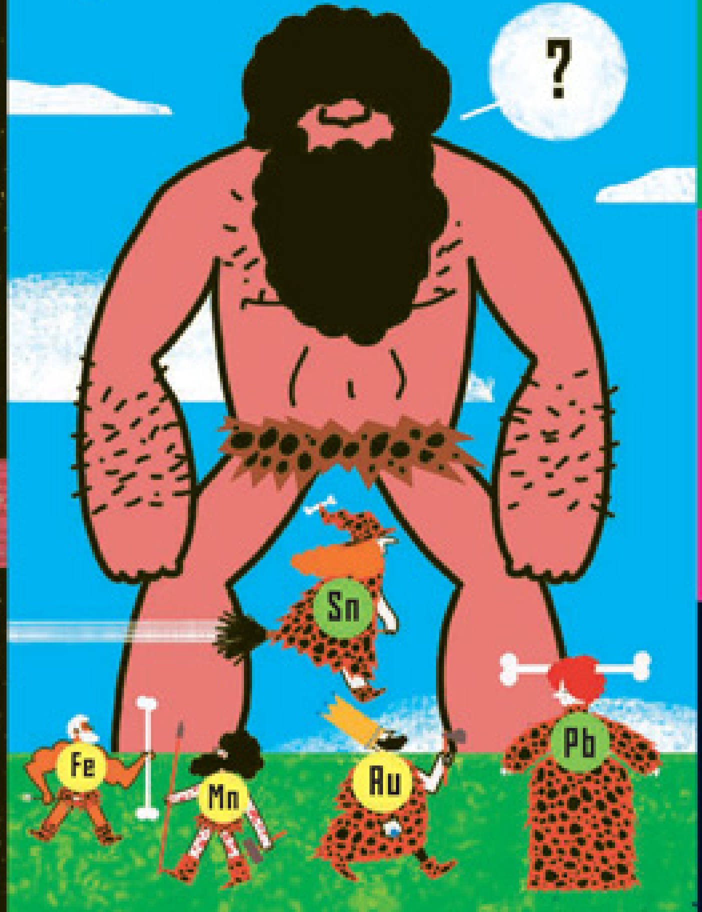
$1N_2$ (g) $3H_2$ (g) $2NH_3$ (g)

How do we Discover the Elements?

There was a time when we thought that the Universe was made up of just four elements: air, water, earth and fire. Yet as we learned more we realised there was a better way to classify the ingredients that make up the world around us.

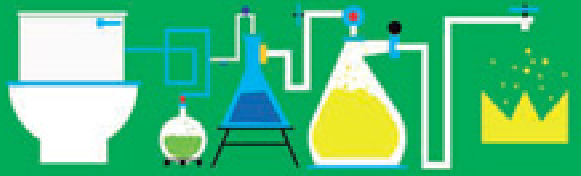
PREHISTORIC

The story starts thousands of years ago when our ancestors made use of new materials to build themselves a better world. The Iron Age started about 3,200 years ago and lasted for six hundred years. We learnt how to build tools out of the element with the atomic number 26. Iron is one of thirteen elements known to humans since ancient times. Others include gold, lead, tin and zinc.



ALCHEMY

It was from the 1600s when the list really started to get bigger as scientists began to experiment with new **substances**. The element phosphorus was discovered in urine by an alchemist – a person trying to turn everyday **chemicals** into gold. By boiling chemicals and turning gases into liquids, alchemists identified a host of new elements including oxygen, nitrogen and hydrogen.



SPECTROSCOPY

The mid-1800s saw the rise of a technique called **spectroscopy**. Electrons moving between shells (see page XII) inside an atom give out light that is unique to that particular element. Scientists including Robert Bunsen – who gives his name to the Bunsen burner – used this light to discover elements caesium and rubidium.

During the 19th century there was a real explosion in the number of new elements discovered – a total of 49.

SYNTHETIC

A further 35 have been found since 1900. During and after World War Two, scientists were experimenting with **nuclear** weapons, such as atomic bombs. They discovered new elements including curium and americium while testing them. New elements were also found by firing small elements at bigger ones at really high speeds inside enormous machines – a method called **bombardment**. Mendelevium – named after the inventor of the **periodic table** (see p101) – was discovered in 1955 by firing helium at an element named after another famous scientist: einsteinium.

The Periodic Table

Our element story is far from finished – the number of elements is still growing as we work to discover new ones. That same bombardment technique is how the latest additions to the element list – tennessine and oganesson – were found in the twenty-first century. It is getting harder to find heavier elements because they are very unstable and disappear in the blink of an eye.

The rows are called **'periods'**, which is where the name of the table comes from. Elements get heavier as you move from left to right along a period. The size of an atom of each element decreases from left to right because adding more protons means the nucleus can keep electrons in a tighter orbit around it.

K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr

The table has eighteen columns called **'groups'**. Normally all elements in a group have a similar pattern of electrons in their outer shell. Elements get heavier as you move down a group.

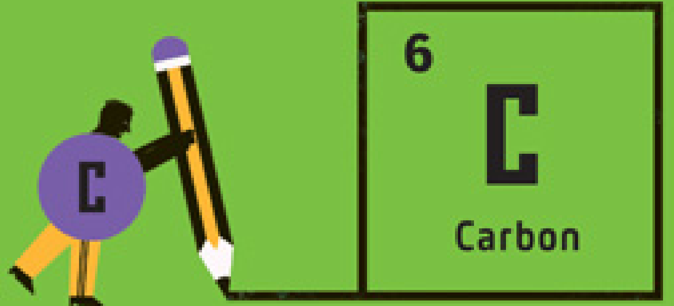
He
Ne
Ar
Kr
Xe
Rn
Og

With well over one hundred elements to deal with, scientists organise them into groups based on the way they behave. It is called the **periodic table**, which was invented by Russian scientist Dmitri Mendeleev in 1869.

1 H Hydrogen																	2 He Helium
3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Flourine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium											13 Al Aluminium	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon
55 Cs Caesium	56 Ba Barium	57–71	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astantine	86 Rn Radon
87 Fr Francium	87 Ra Radium	89–103	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium	113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson

Lanthanides	57 La Lanthanum	58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thallium	70 Yb Ytterbium	71 Lu Lutetium
Actinides	89 Ac Actinium	90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium

To save more space, elements are given a one or two letter **symbol**. It could be its first letter – such as C for carbon and O for oxygen, or based on the Latin name for the element like Pb for lead (plumbum).



There are so many elements in two periods – the lanthanides and actinides – that they are moved to the bottom to stop the table becoming too wide. That makes it easier to print in books like this one. The lanthanides and actinides are just two examples of other ways to group the elements (see the colour-coded sets on pXI).

Key

Every time a new element is discovered it gets added to the periodic table. Chemists know exactly where to put it because it runs from the element with the lowest atomic number (hydrogen) to the highest (currently oganesson). Its inventor – Dmitri Mendeleev – even left gaps for elements yet to be discovered. What makes the periodic table such a smart tool is that elements that behave similarly appear close together. These groups are colour-coded, as you will see below.

ALKALI METALS
The first column of the periodic table is home to the alkali metals (hydrogen doesn't belong to this group). The alkali metals are shiny, highly reactive and soft enough to cut with a knife.

ALKALI EARTH METALS
The six silvery-white elements in Group 2 have low melting and boiling points. They often form **compounds** with the halogens, including sodium chloride (also known as table salt).

TRANSITION METALS
This is by far the biggest group in the table with 35 members – that's almost a third of all known elements. Transition metals are very hard, with high melting points and boiling points.

POST-TRANSITION METALS
The post-transition metals usually prefer to bond with other elements using covalent bonds. There is a lot of debate among chemists as to which elements to include in this group.

METALLOIDS
The behaviour of a metalloid is a cross between a metal and a non-metal. Their appearance is similar to metals, but they are not good conductors of electricity.

NON-METALS
Non-metals are usually light and poor conductors of heat and electricity. Many of them play a key role in biology.

HALOGENS
These elements make up a small group of five non-metals that often combine with metals to make salts. They are often used as disinfectants.

THE NOBLE GASES
The noble gases already have a full outer shell of electrons so they tend not to get involved in chemical reactions. Usually they don't have a smell or colour either.

LANTHANIDES
These are named after the first element in the group (lanthanum). Along with scandium and yttrium they make up another class called the Rare Earth elements because they tend to be dug out of the Earth's crust.

ACTINIDES
Unlike most clusters in the periodic table, the properties of the actinides vary considerably across its fifteen metallic elements. All actinides are radioactive.

A Guide to the Elements

Each element in this book will be assigned symbols to tell you more about it.

STATE AT 20°C
These symbols inidcate the state of each element at 20°C (solid, liquid or gas).

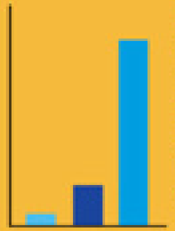
WHERE ON EARTH?
This symbol indicates where you can find the element in the world.

DANGER TO LIFE
This indicates whether a substance is non-toxic, toxic or a mixture.

SPECIAL USES
This highlights how we make use of the element to improve our lives.

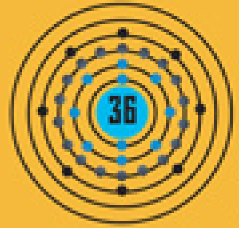
DATE OF DISCOVERY
A magnifying glass indicates the year the element was 'discovered'. Often, this indicates the date it was first isolated.

ELEMENT RANKINGS



Every element has a different **density**, **melting point** and **boiling point**. In the pages that follow, every element has been ranked from 1 to 118 from highest to lowest for each of these three key properties. A category plot like the one shown here will illustrate this information on each page.

ELECTRON SHELL CONFIGURATION
Below, you can see an example of an element's electron shell configuration. The electrons whizzing around the nucleus determine the element's chemical properties – the way it behaves in a chemical reaction. The total number of electron shells an atom has determines what period the element is in. The number of electrons in its outermost shell determines the group. The number in the middle represents the protons in the nucleus of that element – its unique signature.



ATOMIC MASS
83.798

This number indicates the average mass of an element's **isotopes** as found in nature.

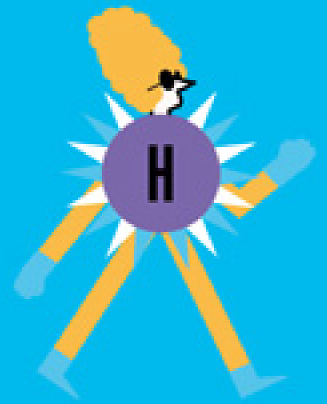
This circle fills as the atomic number increases.

These bars indicate which row the element can be found on.

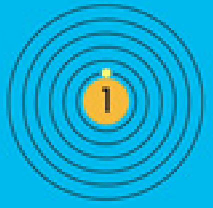
This number indicates the atomic number of the element, and is also the page number.

THE NAME AND COLOUR OF THE GROUP WILL APPEAR HERE

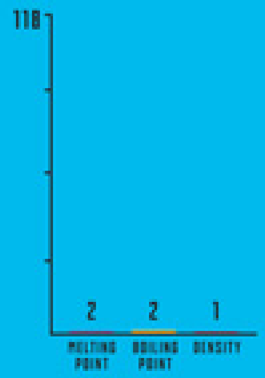
HYDROGEN



ELECTRON CONFIGURATION



ELEMENT RANKINGS



ATOMIC MASS
1.008

STATE AT 20°C
A colourless, odourless gas.

WHERE ON EARTH?
Found in the greatest quantities as water.

DANGER TO LIFE
Non-toxic, it is essential for almost all living things.

SPECIAL USES
Clean fuel, fertiliser, margarine, silicon chips.

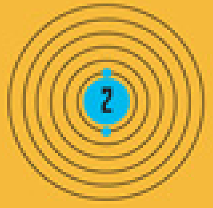
A FUTURE FUEL

DISCOVERED IN 1766

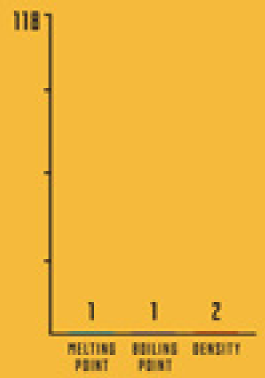
Hydrogen is the oldest and most abundant element. It makes up 75 per cent of the Universe and provides the fuel for stars. Hydrogen is also the simplest element with a solitary electron orbiting one proton, making it so light that it can easily escape Earth's gravity. Hydrogen is also the main constituent of water (H_2O) and extracting it from water could give us a clean energy source as we try and move away from fossil fuels.

HELIUM

ELECTRON CONFIGURATION



ELEMENT RANKINGS



ATOMIC MASS
4.003

STATE AT 20°C
A colourless, odourless gas.

WHERE ON EARTH?
Found in natural gas which contains up to 7% helium.

DANGER TO LIFE
No known biological role. It is non-toxic.

SPECIAL USES
MRI scanners, supermarket scanners, deep-sea divers.

SHORT SUPPLY

DISCOVERED IN 1895

First discovered on the Sun, helium is named after Helius, the Greek sun god. Whilst it is the second most abundant element in the Universe, you can't just grab hold of it on Earth. Helium is mostly produced as a by-product of the natural gas industry and is now in short supply. As it's lighter than air, it's commonly used in zeppelins and party balloons. But think twice before your next birthday, as helium supplies are running out and we need it for important medical equipment.

LITHIUM

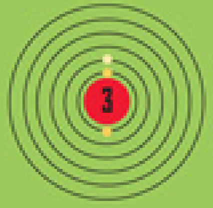
STATE AT 20°C
A soft, silvery metal.

WHERE ON EARTH?
Found in igneous rocks, seawater and mineral springs.

DANGER TO LIFE
No known biological role.
It is toxic, except in small doses.

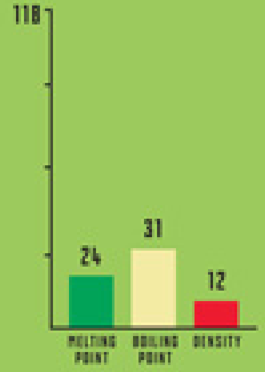
SPECIAL USES
Toys, clocks, aircraft, bicycle frames, high-speed trains.

ELECTRON CONFIGURATION



ATOMIC MASS
6.94

ELEMENT RANKINGS



A BIG BANG

DISCOVERED IN 1817

Lithium is the only metal light enough to float on water. It is so reactive that it is rare to find on Earth on its own – normally it has combined with other elements to form a compound. It was one of the elements made in the first minutes after the birth of our Universe during the Big Bang. Today, it is used to create red colours in fireworks displays. More commonly, we use it to make the small but powerful batteries found in devices such as smartphones. Lithium was famously the title of a popular track by the rock band Nirvana.

BERYLLIUM

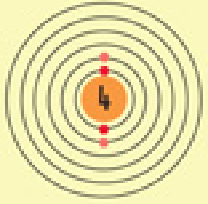
STATE AT 20°C
A soft, silvery-white metal.

WHERE ON EARTH?
Found in 30 different mineral species including emerald.

DANGER TO LIFE
Deadly poisonous if dust or fumes are inhaled.

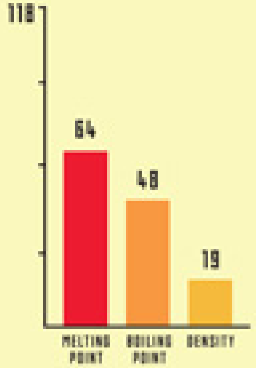
SPECIAL USES
Gyroscopes, springs, high-speed aircraft, X-rays.

ELECTRON CONFIGURATION



ATOMIC MASS
9.012

ELEMENT RANKINGS

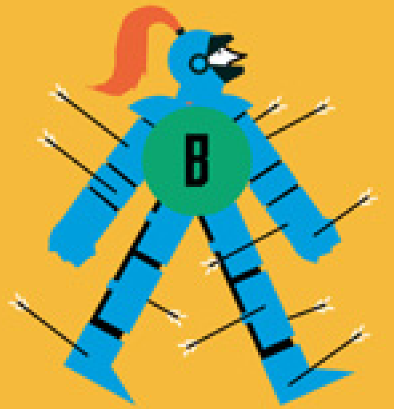


COSMIC RAIN

DISCOVERED IN 1797

Gemstones containing the mineral beryl, such as emeralds, have been known since ancient times. When chemists later isolated the main element inside, they called it beryllium. It is mostly made when high-energy particles called cosmic rays strike the Earth's atmosphere from space. This creates a shower of particles – including beryllium – which rain down from the sky. Its properties make it perfect for spacecraft and communication satellites.

BORON



STATE AT 20°C
A dark, black-brown powder in its purest state.

WHERE ON EARTH?
Found in volcanic spring waters and in minerals such as borax.

DANGER TO LIFE
It is non-toxic but can upset the body's metabolism if consumed.

SPECIAL USES
Rocket fuel igniter, pyrotechnic flares, washing powders.

HARD STUFF

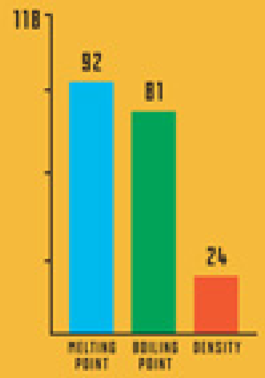
DISCOVERED IN 1808

The name boron comes from the Persian or Arabic terms for the mineral borax (*burah* or *buraq*). Borax and boric acid have been known since ancient times in Europe, Tibet and China. They were used by craftsmen to reduce the melting point of materials in glassmaking and other applications. Today, boron carbide (B_4C) is used in armour plating for vehicles and bulletproof vests. It has also been found on the Moon and Mars, and in some meteorites.

ELECTRON CONFIGURATION

ATOMIC MASS
10.81

ELEMENT RANKINGS



CARBON

STATE AT 20°C
Found in many forms: graphite, diamond, graphene.

WHERE ON EARTH?
Found in the Sun, the stars and in our atmosphere.

DANGER TO LIFE
Non-toxic, it is essential for all living things.

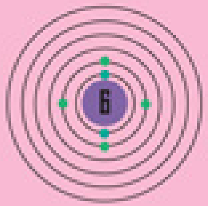
SPECIAL USES
Tennis rackets, skis, fishing rods, rockets, aeroplanes.

LIFE ON EARTH

DISCOVERED IN ANCIENT TIMES

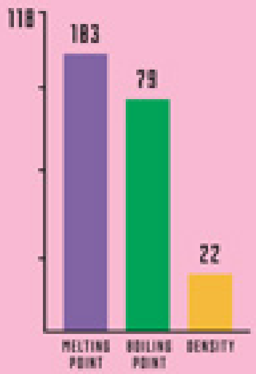
Carbon is the basis for life on Earth. It is unique in its ability to form complex chemicals by bonding with other elements in a variety of ways including single, double and triple bonds. The 'lead' in a pencil isn't lead at all, but graphite – a material made from carbon atoms arranged in hexagons. Diamond may look very different but it is also made of carbon. And it's not just the hard stuff, almost everything you eat is made up from carbon compounds, too.

ELECTRON CONFIGURATION



ATOMIC MASS
12.011

ELEMENT RANKINGS

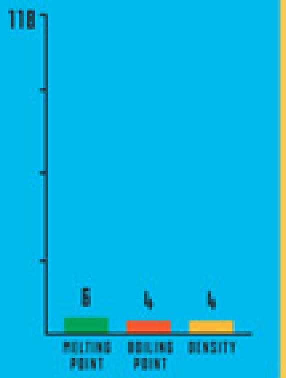


NITROGEN

ELECTRON CONFIGURATION

ATOMIC MASS
14.007

ELEMENT RANKINGS



STATE AT 20°C
A colourless, odourless gas.

WHERE ON EARTH?
Found in all living things, it makes up 78% of the air, by volume.

DANGER TO LIFE
Non-toxic, it is essential for all living things.

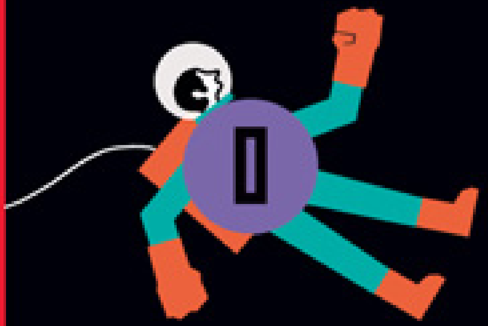
SPECIAL USES
Dyes, explosives, freezing food, fertilisers, nitric acid, nylon.

KEY INGREDIENT

DISCOVERED IN 1772

Nitrogen is the most abundant element in the Earth's atmosphere, making up 78 per cent of the air we breathe. It is also a key ingredient for life, found in important biological chemicals such as amino acids. Compounds of nitrogen – called nitrates – are a crucial part of the fertilisers used by farmers and gardeners to help grow plants. Super cold liquid nitrogen can be used by chefs to help make cold food such as ice-creams and sorbets.

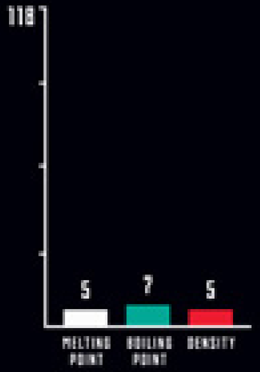
OXYGEN



ELECTRON CONFIGURATION

ATOMIC MASS
15.999

ELEMENT RANKINGS



STATE AT 20°C
A colourless, odourless gas.

WHERE ON EARTH?
Found in the atmosphere, the Earth's crust and the human body.

DANGER TO LIFE
Non-toxic, it is essential for all living things.

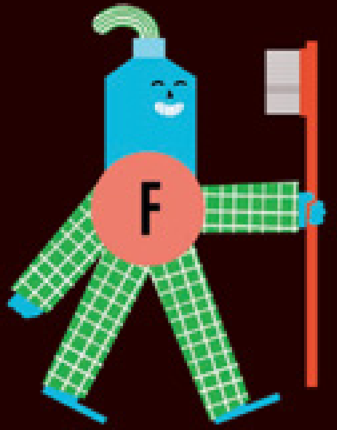
SPECIAL USES
Steel industry, anti-freeze, polyester.

3-MINUTE RULE

DISCOVERED IN 1774

Oxygen is arguably the most important element to you. You cannot last more than three minutes without it. Although it is the third most abundant element in the Universe, and makes up 21 percent of Earth's atmosphere, astronauts still need spacesuits to make sure they have an oxygen supply in space. It is the most reactive of all the non-metals, so easily bonds with other elements to form compounds such as water (H_2O), carbon dioxide (CO_2) and iron oxide (rust, Fe_2O_3).

FLUORINE



STATE AT 20°C
A pale yellow-green gas.

WHERE ON EARTH?
Found in the minerals fluorite, fluorspar and cryolite.

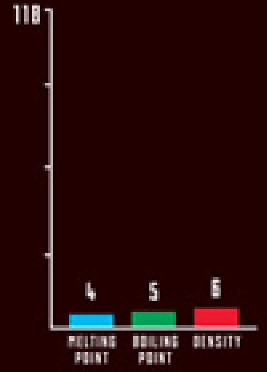
DANGER TO LIFE
Essential to humans, (our bodies contains about 3mg) but highly toxic in pure form.

SPECIAL USES
Nuclear energy, frosting glass, light bulbs.

ELECTRON CONFIGURATION

ATOMIC MASS
18.998

ELEMENT RANKINGS



PEARLY WHITES

DISCOVERED IN 1886

Despite its common usage in toothpaste, fluorine is the most chemically reactive element. Fluorine reacts, often very vigorously, with all of the other elements except oxygen, helium, neon and krypton. Fluorine is also the most electronegative element. In molecules, this means that fluorine attracts electrons more powerfully than any other element. It is often added to tap water to help fight tooth decay but too much fluoride is toxic.

NEON

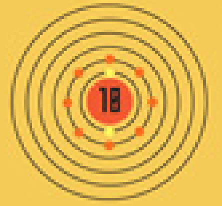
STATE AT 20°C
A colourless, odourless, tasteless gas.

WHERE ON EARTH?
Found in Earth's atmosphere, it is the 5th most abundant element.

DANGER TO LIFE
No known biological role. It is non-toxic.

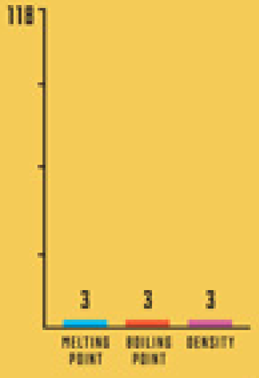
SPECIAL USES
Neon signs, diving equipment, high-voltage indicators, lasers.

ELECTRON CONFIGURATION



ATOMIC MASS
20.18

ELEMENT RANKINGS



VIVA LAS VEGAS

DISCOVERED IN 1898

Neon is associated with bright signs that glow vibrant red-orange, famous in Las Vegas, USA. As the second lightest noble gas, neon doesn't usually take part in chemical reactions. Yet if you pass an electric current through a tube of neon it boosts electrons into higher shells. When they fall back down again they give off a distinctive colour, which one of neon's discovererers – William Ramsay – referred to as a 'brilliant flame-covered light' in his Nobel Prize speech.

SODIUM

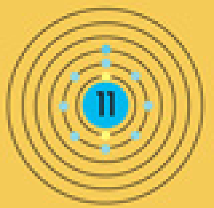
STATE AT 20°C
A soft metal that tarnishes quickly in air.

WHERE ON EARTH?
Found in salt beds and minerals such as sodalite and cryolite.

DANGER TO LIFE
Sodium compounds are vital to life, but pure sodium is highly dangerous.

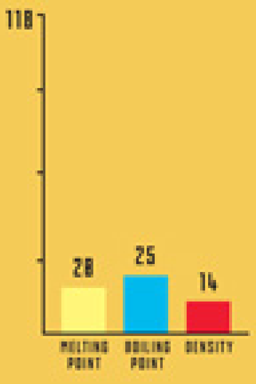
SPECIAL USES
Nuclear reactors, common salt, de-icer, water softener.

ELECTRON CONFIGURATION



ATOMIC MASS
22.99

ELEMENT RANKINGS



A BIT OF SALT

DISCOVERED IN 1807

Soft enough to be cut with a knife, sodium belongs to the alkali metal family. We use it a lot in our everyday life: to season our food in the form of sodium chloride (table salt) or sodium bicarbonate (baking powder) in cooking. Our bodies use sodium for lots of different things, such as sending signals between nerve cells. Our street lights are gradually switching to LED bulbs, but some still use sodium to create light in a similar way to neon signs.

MAGNESIUM

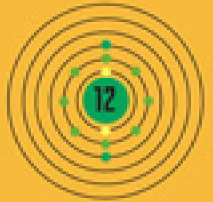
STATE AT 20°C
A silvery-white metal that burns with a bright light.

WHERE ON EARTH?
Found in the sea and in minerals such as magnesite and dolomite.

DANGER TO LIFE
Non-toxic, it is essential in both plant and animal life.

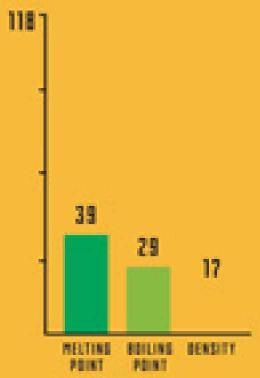
SPECIAL USES
Car seats, laptops, cameras, power tools, cattle feed.

ELECTRON CONFIGURATION



ATOMIC MASS
24.305

ELEMENT RANKINGS



GREEN AS GRASS

DISCOVERED IN 1755

Difficult to extinguish because of its ability to burn with nitrogen, water and carbon dioxide, this shiny metallic element produces bright flames. That's why it is often used in fireworks and sparklers. A single ion of magnesium is also found in the centre of chlorophyll cells – the green pigment that gives plants their colour. It plays a crucial role in photosynthesis – the process by which plants create their own food by turning sunlight and carbon dioxide into sugar and oxygen.